Base Year: 2000 By: M. Nguyen

SOURCE INVENTORY

CATEGORY # 31

WINERIES - FERMENTATION

1999 EMISSIONS

Introduction

This category accounts for the ethanol emissions resulting from the fermentation of grapes at wineries located in the Bay Area. During the fermentation process, sugar in the grape juice reacts with yeast to form ethanol (alcohol) and carbon dioxide (CO_2) gas. Ethanol is emitted into the atmosphere through evaporation. The amount of ethanol formation is dependent on tank design, length of fermentation period, fermentation temperature, and volume and sugar content of fermenting juice. Sugar content is measured as degrees Brix (grams sugar/100 ml. juice).

Methodology

Wine production in the Bay Area was estimated based on ARB's 1988 methodology, showing 157.08 gallons of wine yield per ton of grapes crushed. Up through 1994, grapes crushed were based on California Department of Food and Agriculture's report "Final Grapes Crush Report", showing the amount of grapes crushed in each of the 17 growing districts in the state. For 1999 in the District, 150,355 tons of grapes crushed were taken from each county's "Agricultural Crop Report". This translates to about 23,617,763 gallons of wine production in the Bay Area.

Emission factors from the three types of wine (White, Rose, and Red) were derived by the ARB from a computer model developed by Williams and Boulton. The resulting factors are 2.5, 2.9 and 6.2 lbs. alcohol per thousand gallon of wine produced for white wine, rose wine, and red wine respectively. Using an estimated production of wine as: 73% white 14% rose, and 13% red wine, a composite emission factor of 3.037 lbs. per thousand gallon of wine produced was derived.

The total emissions for this category are determined by multiplying the emission factor and the wine production. This methodology is presently based on ARB's methodology (Section 5.1).

1999 Emission Calculations

Emissions = 23,617.80 thou.gal./yr x 3.037 lbs./thou.gal. / 2,000 lbs./ton / 365 days/yr

= 0.098 ton/day of ethanol in the District.

Monthly Variation

The ethanol emissions associated with wine fermentation occurs during the grape crushing season, which generally runs from mid-August through October.

County Distribution

County distribution was based on the amount of wine production in each county. Alameda, Contra Costa, Napa, Santa Clara, Solano, and Sonoma Counties were assumed to produce wine.

TRENDS

History

For emission inventory before 1982 Base Year, the throughput was obtained from the Wine Institute located in San Francisco. Since 1982 Base Year, the throughput has been obtained from the "Final Grape Crush Report" published by the California Department of Food and Agriculture. For Base Year 1999, data were obtained from each county's "Agricultural Crop Report".

Growth

Although phylloxera bugs attack vine rootstock, the wine production in vineyards may increase at moderate rate in future years. Past and future projection of emissions were based on the food manufacturing industries taken from ABAG 's "Projections" report.